

WHAT IS CLAIMED IS

1. A composite laminate having a sandwich structure made of a core inserted between two layers, wherein:

- the core and the two layers are composite,
- at least a portion of the fibers of the core are fibers whose mechanical strength is significantly lower than that of at least a portion of the fibers of one and/or the other layer.

2. A laminate according to claim 1, wherein it has a total thickness e less than or equal to 3 mm.

3. A laminate according to claim 2, wherein the core has a thickness e_2 less than or equal to 2 mm.

4. A laminate according to claim 1, wherein the polymer matrix, preferably made of resin, of the composites forming the layers and the core, is constituted by a single product.

5. A laminate according to claim 1, wherein the ratio of the thickness e_2 of the core to the total thickness $e_3 + e_4$ of the two layers is defined as follows:

$$e_2 / \frac{e_3 + e_4}{2} \leq 5$$

preferably

$$e_2 / \frac{e_3 + e_4}{2} \leq 4$$

and even more preferably

$$0.1 \leq e_2 / \frac{e_3 + e_4}{2} \leq 3.5.$$

6. A laminate according to claim 1, wherein the fibers of the core are woven or unwoven, oriented in one or several directions or non-oriented, and are preferably selected from the group including:

- the textile (micro)fibers made of:
 - synthetic polymers: polyamides (NYLON®), polyolefine, polyesters, polyesterimides...
 - natural polymers: silk, cotton, linen, jute, hemp,
- the cellulose fibers.

7. A laminate according to claim 1, wherein the fibers of the layer or layers are woven or unwoven, oriented in one or several directions or non-oriented, and are selected from the group of high performance (micro)fibers including:

- carbon (micro)fibers;
- glass (micro)fibers;
- synthetic polymer (micro)fibers, in particular polyolefines, more specifically oriented and stretched high density polyethylene fibers DYNEEMA®, polyamide fibers KEVLAR® TEVARON® or other fibers such as VECTRAN® or SPECTRA®;
- metallic (micro)fibers, in particular aluminum, titanium, or boron (micro)fibers;
- natural (micro)fibers such as silk.

8. A laminate according to claim 1, wherein:

- the micro-fibers of the core, woven or unwoven, oriented in one or several directions or non-oriented, have a characteristic of rupture stress CR (in Mpa) in longitudinal traction such that:

$$CR \leq 1\,500$$

preferably

$$CR \leq 1\,000$$

and even more preferably

$$CR \leq 750$$

or

- ☐ the micro-fibers of the layer(s), woven or unwoven, oriented in several directions or non-oriented, have a modulus M (in Mpa) in longitudinal traction such that:

$$M \leq 50\,000$$

preferably

$$M \leq 30\,000$$

and even more preferably

$$M \leq 20\,000$$

or

- ☐ the micro-fibers of the layer(s), woven or unwoven, oriented in several directions or non-oriented, have an elongation at rupture AR (in %) in longitudinal traction, such that:

$$AR \geq 1.0$$

preferably

$$AR \geq 1.5$$

and even more preferably

$$AR \geq 2.0$$

9. A laminate according to claim 1, wherein the core and/or the layer or layers are obtained by superimposing a plurality of folds of fibrous and/or composite material.

10. A laminate according to claim 1, wherein at least one of the layers is transparent so that the core is visible, the latter advantageously comprising decorating elements

11. A laminate according to claim 1, wherein it has a characteristic of tensile strength R in a bending test Tf with respect to a specimen test piece made of a carbon fiber composite having the same shape and rigidity as those of the test pieces tested, such that:

$$R \geq 50,$$

preferably

$$R \geq 60,$$

and even more preferably

$R \geq 70$.

12. A method of manufacturing a laminate according to claim 1, wherein one or several folds forming the core and one or several folds forming the layers are superimposed, these folds being formed by plies of micro-fibers that are woven or unwoven, oriented or non-oriented, preimpregnated or non-preimpregnated with resin.

13. A use of a laminate according to claim 1 for manufacturing sports articles, and especially:

- boots, in particular bottom assembly or upper, and more specifically sports boots,
- sports articles, in particular roller skates, skis, snowboards, skateboards, golf club shaft and head, scooters, cycles, fishing rods, racquets, helmets, cross country ski poles, backpack frames, tent pegs ...

14. Articles such as obtained according to the use in claim 13.

15. A use of a laminate according to claim 1 for obtaining a composite laminate layer.